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Japanese (PDF)

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FULL CONTENTS CLAIM + DETAILED DESCRIPTION  
TECHNICAL FIELD PRIOR ART EFFECT OF THE  
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE

[Translation done.]

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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 05/30/2008 / Priority: 1. Electronic engineering / 2. Chemistry / 3. Industrial Products

**CLAIM + DETAILED DESCRIPTION**

**[Claim(s)]**

[Claim 1] The thermoplastics Plastic solid characterized by being the Plastic solid which contains an electric conduction agent in thermoplastics, and the electric conduction agent being a carbon nanotube.

[Claim 2] The thermoplastics Plastic solid according to claim 1 characterized by the volume resistance values of a Plastic solid being below 0.5ohm and cm.

[Claim 3] The thermoplastics Plastic solid according to claim 1 or 2 characterized by coming to choose thermoplastics out of a fluororesin, fluororubber, polyolefine, and a polyolefin elastomer.

[Claim 4] The thermoplastics Plastic solid of the Claims 1-3 characterized by being thermoplastics / electric conduction agent =40 / 60 - 85/15 (bulk density) comparatively of thermoplastics and an electric conduction agent given in \*\* any 1 clause.

[Translation done.]

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the thermoplastics Plastic solid which was applied to the thermoplastics Plastic solid, especially was excellent in a heat-resisting property and corrosion resistance with conductivity.

[0002]

[Description of the Prior Art] Although the main characteristics for which polymeric materials are asked vary with a product or a use in a modern electronics field, As resin with which are moldability, a heat-resisting property, endurance, high conductivity, corrosion resistance, and recycling efficiency, and \*\*\*\*\* is made satisfied of these demands The thermosetting resin represented by an epoxy resin, phenol resin, etc., the engineering plastics represented by polyphenylene oxide, a liquid crystal polymer, polyimide, polycarbonate, etc., etc. are used.

[0003] However, although the request to the material which possesses synthetically each function mentioned above had a strong thing, there was a problem of it having been technically difficult and becoming disadvantageous in respect of a price in many cases. Conductivity is in one of such the technical technical problems, and development of the polymeric materials which combine a heat-resisting property and corrosion resistance further is called for. In order for the mass capacitor which uses sulfuric acid solution for the polymer electrolyte fuel cell with which especially polyelectrolyte has proton conductivity, or an electrolytic solution to assume strong acidity, as for the member used, high conductivity and acid resistance are required.

[0004]

[Problem(s) to be Solved by the Invention] The purpose of this invention is to offer the thermoplastics Plastic solid which was excellent in conductivity and was excellent in a heat-resisting property and corrosion resistance.

[0005]

[Means for Solving the Problem] The place which this invention finds out the thermoplastics Plastic solid which can cancel an above-mentioned problem, and is made into the summary is a Plastic solid which contains an electric conduction agent in thermoplastics, and is in the thermoplastics Plastic solid characterized by the electric conduction agent being a carbon nanotube. It comes to choose thermoplastics out of a fluororesin, fluororubber, polyolefine, and a polyolefin elastomer including the volume resistance value of the above-mentioned Plastic solid being 0.5 or less ohm-cm. It includes that it is thermoplastics / electric conduction agent =40 / 60 - 85/15 (bulk density) comparatively of thermoplastics and an electric conduction agent.



[0006]

[Embodiment of the Invention] This invention is explained in detail hereafter. As thermoplastics used for the thermoplastics Plastic solid of this invention, a fluororesin, fluororubber, polyolefine, and a polyolefin elastomer can use it conveniently from an acid-proof point. As an example of a fluororesin and fluororubber, PTFE (polytetrafluoroethylene), PFA (tetrafluoroethylene perfluoroalkyl vinyl ether copolymer), FEP (tetrafluoroethylene hexafluoropropylene copolymer), EPE (tetrafluoroethylene hexafluoropropylene perfluoroalkyl vinyl ether copolymer), ETFE (tetrafluoroethylene ethylene copolymer), PCTFE (polychlorotrifluoroethylene resin), ECTFE (chlorotrifluoroethylene ethylene copolymer), PVDF (polyvinylidene fluoride), PVF (polyvinyl fluoride), THV (tetrafluoroethylene hexafluoropropylene vinylidene fluoride copolymer), VDF-HFP (fluoridation vinylidene hexafluoropropylene copolymer), TFE-P (fluoridation vinylidene propylene copolymer), [0007] At least one or more kinds of the fluororesins or fluororubber which consists of fluorine-containing silicone system rubber, fluorine-containing vinyl ether system rubber, fluorine-containing FOSUFAZEN system rubber, and a fluorine-containing thermoplastic elastomer can be used. PVDF, THV, VDF-HFP, and TFE-P which contain vinylidene fluoride from a point of moldability especially by the resin which illustrated [ above-mentioned ] are desirable.

[0008] As an example of polyolefine and a polyolefin elastomer, they are polyethylene, polypropylene, polybutene, Pori 4 methyl 1 pentene, poly hexene, and the poly octene, [0009] At least one or more kinds of the polyolefines and the polyolefin elastomers which consist of hydrogenation styrene butadiene rubber, EPDM, EPM, and EBM can be used. By especially the resin that illustrated [ above-mentioned ], polypropylene and EPDM are desirable from a point of a heat-resisting property and moldability.

[0010] [ the carbon nanotube mixed to thermoplastics, such as the above-mentioned fluororesin, fluororubber, polyolefine and a polyolefin elastomer, ] 0.001-0.5 micrometer of diameters of a fiber are 0.005-0.3 micrometer preferably, and fiber length's 0.5-30 micrometers are preferably desirable in conductive improvement 0.1-100 micrometers. The carbon nano horn which the tip part closed as a carbon nanotube is also included. Moreover, it can mix with other carbon system electric conduction agents as an electric conduction agent, and can also use. As other carbon system electric conduction agents, \*\*, such as artificial graphite, natural graphite, carbon black, expanded graphite, a carbon fiber, and a carbon staple fiber, can be used.

[0011] the rate of thermoplastics and an electric conduction agent --

thermoplastics / electric conduction agent =40 / 60 - 85/15 (bulk density) -- thermoplastics / electric conduction agent =50 / 50 - 85/15 (bulk density) are preferably good. In the case of the above-mentioned thermoplastics and an electric conduction agent where fabrication becomes difficult and exceeds 85/15 since there are comparatively few rates of thermoplastics less than 40/60, since there are few rates of an electric conduction agent, there is a problem of being inferior to conductivity.

[0012] Although the manufacture method in particular of the thermoplastics Plastic solid of this invention is not limited, it should just be based on extrusion, roll diffusion bonding, a usual injection-molding method, or a usual transfer-molding method.

[0013] Hereafter, although a work example is explained, this invention is not limited to this.

[Example] (EXAMPLE) The carbon nanotube (Showa Denko K.K. make gaseous phase method carbon fiber "VGCF") was mixed with the fluoro resin (Sumitomo 3M "THV220G") with the twin screw extruder (mixed temperature of 250 degrees C) at the bulk density by combination of 70/30, 75/25, and 80/20. The thing with 0.15 micrometer in diameter, 1-20 micrometers [ in length ], a relative bulk density of 0.04g [cc ], and a true specific gravity of 2.0g/cc was used for the used carbon nanotube. The created mixture was extruded from the mouthpiece with the twin screw extruder (extruding machine temperature of 250 degrees C), and the sheet was created. The thickness of the acquired Plastic solid was 0.3mm.

[0014] (Comparative example) At the bulk density, the fluoro resin (Sumitomo 3M "THV220G") was mixed with the carbon staple fiber (Toho Tenax Co., Ltd. make "HTA-0040") with the twin screw extruder (mixed temperature of 250 degrees C) by 70/30 of combination as a comparative example. The thing with 4-7 micrometers in diameter, 40-1,000 micrometers [ in length ], a relative bulk density of 0.07g [cc ], and a true specific gravity of 1.77g/cc was used for the used carbon staple fiber. The created mixture was extruded from the mouthpiece with the twin screw extruder (extruding machine temperature of 250 degrees C), and the sheet was created. The thickness of the acquired Plastic solid was 0.3mm.

[0015] The volume resistance value of the acquired thermoplastic Plastic solid was measured. A measuring method is JIS. K According to 7194, it carried out as follows.

1. Measuring Apparatus Loresta HP (made by Mitsubishi Chemical)
2. Measurement Method Four-Poles Four Point Probe Method (ASP Type Probe)
3. 100MA of Measurement Seal-of-Approval Current [0016] The

volume resistance value measured by the above-mentioned method was shown in Table 1.

[Table 1]

表1

	樹脂		導電剤		体積抵抗値
	グレード	重量比	グレード	重量比	( $\Omega \cdot \text{cm}$ )
実施例	THV220G	80%	VGCF	20%	0.38
	THV220G	75%	VGCF	25%	0.11
	THV220G	70%	VGCF	30%	0.045
比較例	THV220G	70%	ペスファイトHTA-0040	30%	1.2

[0017] Compared with the carbon staple fiber, as for the thermoplastics Plastic solid which has the rate of a fluororesin and a carbon nanotube in the range of this invention, it turned out that a volume resistance value becomes in below 0.5ohm and cm, and the outstanding conductivity is shown as shown in Table 1.

[0018]

[Effect of the Invention] As mentioned above, the thermoplastics Plastic solid of this invention has high conductivity, and is polymeric materials which combine a heat-resisting property and corrosion resistance. Since a volume resistance value is small, it excels in corrosion resistance and it can produce by low cost comparatively especially, the availability to a polymer electrolyte fuel cell, a mass capacitor, etc. is large.

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(54)【発明の名称】 導電性に優れた熱可塑性樹脂成形体

(57)【要約】

【課題】 導電性に優れ、耐熱性及び耐蝕性に優れた熱可塑性樹脂成形体を提供する。

【解決手段】 熱可塑性樹脂に導電剤を含んでなる成形体であって、その導電剤がカーボンナノチューブであることを特徴とする熱可塑性樹脂成形体。